

PATENT COOPERATION TREATY
PCT
INTERNATIONAL PRELIMINARY EXAMINATION REPORT
(PCT Article 36 and Rule 70)

Applicant's or agent's file reference B431 PCT	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/GB 03/02889	International filing date (day/month/year) 04.07.2003	Priority date (day/month/year) 16.07.2002
International Patent Classification (IPC) or both national classification and IPC G02B6/25		
Applicant TYCO ELECTRONICS RAYCHEM NV		

<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of 5 sheets.</p>
<p>3. This report contains indications relating to the following items:</p> <ul style="list-style-type: none"> I <input checked="" type="checkbox"/> Basis of the opinion II <input type="checkbox"/> Priority III <input checked="" type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability IV <input type="checkbox"/> Lack of unity of invention V <input checked="" type="checkbox"/> Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement VI <input type="checkbox"/> Certain documents cited VII <input type="checkbox"/> Certain defects in the international application VIII <input type="checkbox"/> Certain observations on the international application

Date of submission of the demand 04.11.2003	Date of completion of this report 26.08.2004
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**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/GB 03/02889

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-15 as originally filed

Claims, Numbers

1-8, 14-21 received on 22.12.2003 with letter of 18.12.2003

Drawings, Sheets

1/22-22/22 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- the language of publication of the international application (under Rule 48.3(b)).
- the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- contained in the international application in written form.
- filed together with the international application in computer readable form.
- furnished subsequently to this Authority in written form.
- furnished subsequently to this Authority in computer readable form.
- The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- the description, pages:
- the claims, Nos.: 27
- the drawings, sheets:

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5. This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

the entire international application,

claims Nos. 9-13,22-26,28-39 (27 missing due to renumbering error)
because:

the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (specify):

the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):

the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

no international search report has been established for the said claims Nos. 9-13,22-26, 28-39

2. A meaningful international preliminary examination cannot be carried out due to the failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions:

the written form has not been furnished or does not comply with the Standard.

the computer readable form has not been furnished or does not comply with the Standard.

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	15,21
	No: Claims	1-8,14,16-20
Inventive step (IS)	Yes: Claims	
	No: Claims	15,21
Industrial applicability (IA)	Yes: Claims	1-8,14-21
	No: Claims	

2. Citations and explanations

see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB 03/02889

1. Reference is made to the following documents:

- D1: US-A-4976390
- D2: US-A-4893892
- D3: US-A-4229876
- D4: US-A-4621754
- D5: WO-A-0041013

Regarding Item III : Non-Establishment of Opinion

2. Because the applicant has not paid the requested additional search fees within the given time limit will the examination be limited to the first invention according to Rule 46.1 (EPC).
Therefore will this communication only consider the amended claim nos. 1-8 and 14-21.

Regarding Item V : Novelty and Inventive Step

3. Novelty

3.1 The document D1 is regarded as being the closest prior art to the subject-matter of independent claim 1, and discloses (fig.4; column 1, line 39 - column 4, line 2):

A device (12, fig.4) for cleaving an optical fibre (40), comprising a fixing mechanism to fix a fixing element (20h) to the optical fibre, and a cleaving mechanism (20d) to cleave the optical fibre (column 3, lines 29-39), (claim 1).

- The subject matter of independent claim 1 is therefore not new.
- The same objection can be based on documents D2-D5.

3.2 The features of amended dependent claims 3-7, 14,16,18 and 20 are present in D1 too, therefore are these features not new.

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- 3.3 The features of amended dependent claims 17 and 19 are present in D2 (figs.1-6, column 1, line 50 - column 3, line 46), therefore are these features not new.
- 3.4 The features of dependent claims 2 and 8 are present in D4 (figs.12,13,14a; column 2, lines 25-41; column 4, lines 4-9; column 13, lines 11-41), therefore are these features not new.

4. Inventive step

Amended claims 15 and 21 appear to lack an inventive step.

5. Comments

- 5.1 The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).
- 5.2 Independent claim 1 is not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art (document D1) being placed in the preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).

Claims

1. A device for cleaving an optical fibre, comprising a fixing mechanism to fix a fixing element to the optical fibre, and a cleaving mechanism to cleave the optical fibre.
2. A device according to claim 1, in which the fixing element comprises a ferrule.
3. A device according to claim 1 or claim 2, in which the fixing element is fixed to the optical fibre such that the fibre extends through the fixing element.
4. A device according to any preceding claim, comprising a hand-held tool.
5. A device according to any preceding claim, in which the cleaving mechanism of the device cleaves the fibre when the fixing element has been fixed thereto.
6. A device according to claim 5, in which the cleaving mechanism of the device is able to cleave the fibre only when the fixing element has been fixed thereto.
7. A device according to any preceding claim, in which the fixing mechanism and the cleaving mechanism are arranged such that the fibre is cleaved, and consequently an end face of the fibre is produced, at a preset position along the fibre with respect to the fixing element.
8. A device according to any preceding claim, in which the fixing mechanism is a crimping mechanism to crimp the fixing element and thereby fix it to the fibre.
9. A device according to any preceding claim, in which the cleaving mechanism cleaves the fibre such that the end face produced is oriented at a non-perpendicular angle with respect to a longitudinal axis of the fibre.
10. A device according to claim 9, in which the fixing mechanism and the cleaving mechanism are mutually arranged such that the fibre end face produced by the cleaving mechanism is at a preset orientation with respect to the fixing element.

11. A device according to claim 10, in which the fixing mechanism includes orientation determining means arranged to orient the fixing element at a predetermined orientation about the longitudinal axis of the fibre, with respect to the cleaving mechanism.
12. A device according to claim 11, in which the orientation determining means comprises a non-circular orifice arranged to receive therein a said fixing element having a corresponding non-circular cross-section.
13. A device according to claim 12, including first closing means that closes the non-circular orifice when the device is not in operation.
14. A device according to any preceding claim, including an aperture by which a separated end portion of the cleaved optical fibre may be removed from the device.
15. A device according to claim 14, including second closing means that closes the aperture when the device is not in operation.
16. A device according to any preceding claim, in which the fixing mechanism grips the fixing element while the cleaving mechanism cleaves the fibre.
17. A device according to any preceding claim, in which the cleaving mechanism includes a clamping mechanism that grips the fibre while the fibre is cleaved.
18. A device according to any preceding claim, in which the fibre is placed under tension and/or shear by the cleaving mechanism while the fibre is cleaved.
19. A device according to any preceding claim, in which the cleaving mechanism includes an anvil that causes the fibre to be bent while the fibre is cleaved.
20. A device according to any preceding claim, in which the cleaving mechanism includes a scoring blade arranged to score the fibre, causing a crack to propagate through the fibre, thereby cleaving the fibre.

21. A device according to claim 21, in which the scoring blade is arranged such that for each fibre, or set of fibres that is/are cleaved by the device, a different position on the blade is used to score the fibre.
22. A device according to any preceding claim, including a lifetime indicator that indicates the number of cleaves that have been made by the device since a device set-up procedure and/or the number of cleaves remaining for the device, preferably until a device re-set procedure.
23. A device according to any preceding claim, which is arranged to cleave a plurality of optical fibres substantially simultaneously.
24. A device according to claim 24, in which the fixing mechanism is arranged to fix one or more said fixing elements to said plurality of optical fibres, preferably substantially simultaneously.
25. A device according to claim 24 or claim 25, in which the plurality of optical fibres comprise ribbon fibre.
26. A device substantially as described herein with reference to the accompanying drawings.
28. A device according to any preceding claim having attached thereto a flexibly-positionable neck and clamp for temporarily attaching the device in a convenient working position on a telecoms distribution frame or other apparatus where optical fibres are to be connected.
29. A device according to any preceding claim, wherein a connector body holder (ASAH) is attached to the device to hold a connector body (ASA) into which (when present) will be inserted a crimped ferrule and cleaved optical fibre prepared by use of the device.
30. A device according to claim 29, wherein the connector body holder (ASAH) is rotatably attached to the device to enable insertion of a ferrule and fibre into each end of the

connector body (ASA), when present, from directions of insertion less than 180 degrees apart, preferably less than 90 degrees apart, more preferably from substantially the same direction of insertion.

31. A device according to claim 29 or 30, having attached thereto a ferrule assembly holder (CKAH) for holding the assembly (CKA) of (i) ferrule and (ii) fibre to be cleaved and (iii) a ferrule holder, which CKAH is adapted to hold the CKA during the crimp and cleave operation.

32. A device according to claim 31, having guide means attached thereto, whereby the CKAH is moveable on a controlled path from the crimp-and-cleave position to bring the CKA into alignment with an ASA when held in the ASA in use, and the CKAH is then releaseable to enable insertion and locking of the CKA into the ASA.

33. A device according to claim 31 or 32, wherein the CKAH carries a re-useable resiliently-compressible member for insertion into a succession of suitably shaped and arranged CKAs, between the end of the ferrule and the facing internal end of the ferrule holder, to compensate resiliently for cleaved fibre length tolerance variations during insertion of the CKAs into ASAs held in the ASA in use, and the said compressible member is removable from the CKAs after insertion and locking of the CKAs into the ASAs.

34. A device according to claim 33, wherein the said compressible member is attached to the CKAH by a flexible member of sufficient length and flexibility to permit release of the CKA from the CKAH and insertion and locking of the CKA into the ASA held in the ASA in use, while the compressible member is in place in the CKA.

35. A device according to claim 34, wherein retraction means are provided for retracting the flexible member after removal of the said compressible member from the CKA, thereby to re-position the compressible member on the CKAH ready for insertion into the next CKA.

36. A device according to claim 29 or 30 having attached thereto securing means for directly securing the ferrule and the fibre during and after the crimp and cleave operation in the absence of any separate ferrule holder.

37. A device according to claim 36 having transfer means attached thereto whereby the securing means and the secured crimped ferrule and cleaved fibre can be moved, preferably guided by guide means attached to the device, (i) to bring the ferrule and fibre from the crimp-and- cleave position into alignment with an ASA when held in the ASA in use and (ii) to insert the ferrule and fibre into the ASA in the required orientation with or without a keying formation on the ferrule, the securing means being releasable after the ferrule has been fixed in the ASA in the required orientation.

38. A method of coupling optical fibres using a device according to claim 32, the method including at least the Steps 1 to 10 hereinbefore described.

39. A method of coupling optical fibres using a device according to claim 37, including the steps of (a) directly securing a ferrule and a fibre in the said securing means during and after the crimp and cleave operation in the absence of any separate ferrule holder, (b) moving the secured crimped ferrule and cleaved fibre (i) to bring the ferrule and fibre from the crimp-and- cleave position into alignment with an ASA when held in the ASA in use and (ii) to insert the ferrule and fibre into the ASA in the required orientation with or without a keying formation on the ferrule, (c) fixing the ferrule and fibre in the ASA in the required orientation, and (d) releasing the securing means.
